*(Root)*Mining Sweepers

Bugs Helping Reduce Leafy Spurge on Game and Fish Lands

Story and photos by Craig Bihrle

In the campaign to clean up leafy spurge in North Dakota, Leo Vetter would much rather sweep than spray.

He's used a metal wand and related devices for most of his 30-plus years as a North Dakota Game and Fish Department wildlife technician, distributing chemicals to stop the spread of spurge on state wildlife management areas. For the most part, however, the chemical assault has only slowed – and seldom stopped – the aggressive spurge from taking over new territory.

Sweeping, in many cases, is starting to yield progress.

Vetter and other wildlife personnel use light canvas nets attached to sturdy wooden handles to sweep over spurge patches under siege from tiny black bugs called root-mining flea beetles. On a good day, sweepers can capture hundreds of thousands of these bugs that live to kill leafy spurge. Over the past several years, they've trapped millions and released them in new areas around the state.

Wildlife managers and private landowners as well are starting to see green in areas previously dominated by spurge stalks, and that's a welcome change for a lot of people who have fought spurge for a long time.

"At least with biological control (bugs), you're starting to see some results," says Game and Department lands and development section supervisor Scott Peterson, who manages more than 37,000 acres of wildlife management areas in central North Dakota. "Now, we feel like we can even make a little headway, and we're not pouring those chemicals into the environment every year."

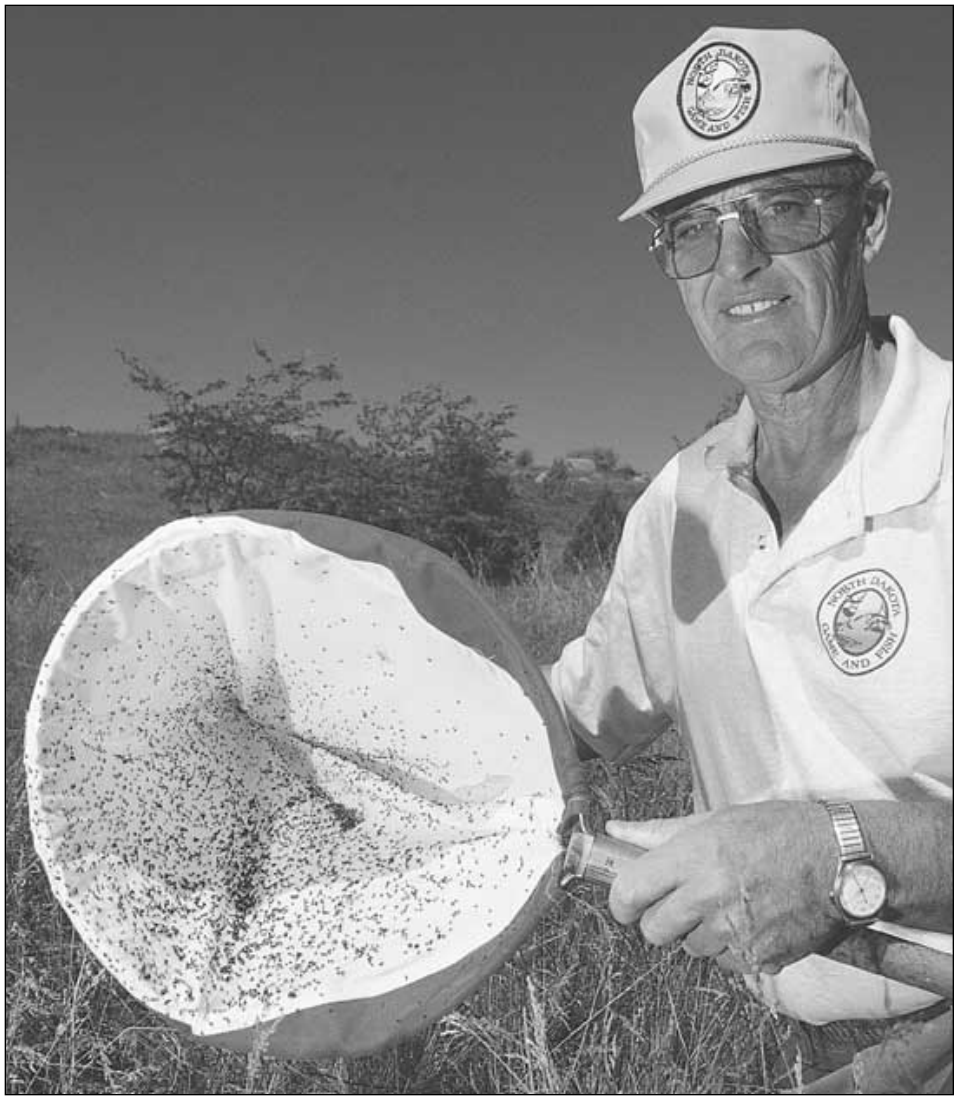
Summarizing Spurge

Leafy spurge is a noxious weed, and a near-perfect one at that. It grows almost anywhere. It resists drought. It crowds out beneficial native plants, and once firmly established it is difficult to kill.

It's not even pretty, either. It's yellow-green flowers that bloom from late May through early July are just yellow enough to stand out against green grasses, but not yellow enough to capture the fancy of wildflower seekers. Compare that to the common dandelion, maligned by many but loved by children who eagerly pick the bright yellow flowers to give to appreciative mothers.

In June, when leafy spurge is in peak bloom, has any child ever picked a bouquet?

Probably not many, but if they did, North Dakota has a good supply. And that's been a headache for the state's private landowners and public land managers for decades. Despite an all-out chemical assault, the number of acres of leafy spurge in North Dakota gradually expanded in the 1960s, '70s and '80s.



Left: Spurge beetles are easy to sweep. Note hundreds of black dots about to be cleaned from leafy spurge plants and dispersed in new areas.

Right: Leo Vetter shows root-mining flea beetles collected after a couple of sweeps. It doesn't look like many, but several hours of sweeping can net hundreds of thousands of beetles.

Leafy spurge is not native to North America. It was first recorded in Maine, an apparent transplant from Europe, in 1827, according to the U.S. Department of Agriculture's Animal and Plant Health Inspection Service. It reached North Dakota in the early 1900s and has since infested about 1.1 million acres. Nationally, leafy spurge covers about 2.5 million acres, and North Dakota has more acres than any other state.

Much of the state's leafy spurge is found in grasslands typically used for cattle grazing, or in wild areas along rivers or on public land managed as wildlife habitat. Spurge makes cattle sick, so they won't eat it. Affected grazing land loses economic value. In 1995, a North Dakota State University report estimated that leafy spurge directly cost farmers and ranchers $27 million in lost productivity each year.

Because of its harmful presence on North Dakota's landscape, leafy spurge has been listed as a noxious weed for decades. State law requires both public and private landowners to treat all noxious weeds on their property.

The Game and Fish Department owns or manages about 200,000 acres in North Dakota. District wildlife resource managers estimate leafy spurge infests approximately 4,000 acres on these state wildlife management areas. While these spurge patches don't reduce cattle grazing potential, they do require treatment.

When that treatment is chemicals, district managers say, it affects both habitat and wildlife on WMAs. While leafy spurge crowds out beneficial native plant species if left alone, treating it with broadleaf herbicides – various chemicals that kill plants with leaves like spurge and dandelions, but don't harm grasses – also kills other broad-leafed plants like forbes and woody shrubs like buck brush, juneberry, chokecherry, and trees.

"Often the end result after spraying was a plant community of one or two species," emphasized Kent Luttschwager, Game and Fish wildlife resource manager at Williston, "versus a diverse plant community in an area."

A diverse stand that includes spurge is usually more beneficial to wildlife than a monotypic stand that develops after spurge is repeatedly sprayed with herbicides. More often than not, however, chemical application doesn't eliminate the spurge. Its roots sometimes extend to 10-12 feet or more under ground. Spray burns down the tops, but doesn't always get to the bottom. When that's the case, the next year the tops are back.

"You spray something over and over and over," Vetter said, "and it's like 'maybe we're doing some good,' and then a year later you come out there and it's spread 20 feet and it's just as thick as it was before, and it's like, 'Man, we might as well use water.'"

Bring on the Bugs

While landowners and managers have tried to kill leafy spurge with chemicals for more than four decades, biological control with bugs is just getting started. In the 1980s USDA researchers identified and cleared for introduction a number of insects that keep leafy spurge in check in Europe and Asia. Of primary importance in North Dakota is the root-mining flea beetle.

Adult flea beetles feed on spurge leaves and in mid-summer lay eggs in soil next to spurge stems. When the eggs hatch, larvae burrow into the soil and feed on spurge roots. Taking a few months off for winter, the larvae resume root-mining in spring until they transform into adults, which emerge from the soil to feed on the above-ground portion of spurge in June and early July. When the time is right, adults lay their eggs and the cycle continues.

While adult feeding devastates the appearance of a stand of leafy spurge, it is the underground root-mining that eventually kills or weakens the plant.

While flea beetles are effective, it took a long time to develop a statewide population that could supply a significant number of landowners who wanted to try them. First introduced in North Dakota in 1986, release areas or "insectories" were closely guarded until the beetle population could support an annual "harvest" of bugs for transplant to another leafy spurge patch.

North Dakota has a little over 1 million acres of leafy spurge yellowing the landscape; more than any other state.

Morton County WMA south of Mandan was the first Game and Fish land selected as a potential insectory. An initial introduction of a brown species of flea beetle didn't work out, so Game and Fish tried another species – a black version – in the early 1990s, "and they just went wild," Vetter said. From that time, Morton County WMA became the first nursery to start supplying beetles for every WMA district around the state. Those transplants have produced new insectories that provide all the beetles Game and Fish can use, and then some.

Because of that success, Game and Fish has switched much of its leafy spurge treatment to biological bugs. Technicians and biologists still use chemicals, and beetles don't work everywhere, particularly on spurge growing in sandy soils. And sweeping and distributing insects still takes time. But overall the amount of money spent on spraying, and the manpower needed to take care of it, have been greatly reduced.

A Skeptic's Story

Leland Hanson has farmed and ranched near Fort Ransom, North Dakota, in the breaks that rise from the scenic Sheyenne River Valley, for nearly 40 years. For the last 31 of those years he's fought the spurge battle. He started out with small spots that he says kept getting worse despite consistent annual spraying.

Still, Hanson was skeptical that little bugs could help reduce spurge when he couldn't make progress with expensive chemicals. "I didn't think too much of them (beetles) when they first started talking about them," he recalled recently.

But seeing is believing. In 1993 and 1996 the Game and Fish Department released beetles on a large area of spurge on the Fort Ransom Wildlife Management Area, a patch that had not diminished despite twice-yearly spraying. The spurge-covered hillside was close to the paved road heading south out of Fort Ransom, and Hanson traveled the road enough over the past few years to notice a change taking place. "That whole hillside used to be yellow," he stated, "and now you can't see any…they've really done a number on the spurge."

Such a number that two summers ago, Brian Kietzman and Rodd Compson, biologists at the Game and Fish office in Jamestown trapped as many bugs as they could to distribute to local landowners. "We had to get them out to people," Kietzman said, because the bugs were going to die of starvation.

In areas where they are plentiful, beetles denude the above-ground portion of leafy spurge. It's the larvae of these bugs, however, feeding on roots, that kill or weaken the plant.

Fortunately, Fort Ransom had an auction sale in progress when Kietzman and Compson drove into town, so they got the word out and set up shop on a street corner and gave out free flea beetles to anyone who wanted them.

Hanson was one of those who picked up a softball-sized cluster of 20,000 bugs and set them to work. The beetles are especially suited for some of his land where spurge is growing in and around wooded draws that aren't readily accessible to spraying equipment, and where spraying could also damage nearby trees.

"It takes awhile before the population gets big enough to where you can see a difference," Hanson acknowledged. "…I know they work because I've seen the results."

Because of its proximity to water, this patch of leafy spurge can't be treated with chemicals that might leach into the lake. Beetles are perhaps the only alternative for trying to reduce this stand.

Not a Quick Solution

Game and Fish land managers are seeing results, too. "Because of recent biocontrol efforts," Luttschwager noted, "what used to be 100-150 acres of spurge is now five acre or three acre patches."

While small patches will persist, Luttschwager and his fellow managers know root-mining flea beetles aren't going to wipe out leafy spurge. They hope, over the long term, that insect and plant will develop together to co-exist as they do in Europe and Asia, where leafy spurge "…remains an insignificant component of the landscape," according to an APHIS publication.

Vetter already sees such a situation at Morton County WMA, where visible spurge has been knocked back considerably in the last decade, creating new room for native plants to grow. From year to year, however, the balance fluctuates. Last summer, Vetter noticed more spurge than the year before. This summer, he expects a bumper crop of beetles to take advantage of a more plentiful food source.

At Fish Creek WMA southwest of Judson in Morton County, Vetter is seeing the same pattern. In the five years since Game and Fish released beetles at Fish Creek, Vetter estimates 95 percent of the spurge was gone in 2000. "That doesn't mean it's going to be gone next year….It's going to be kind of a cycle thing."

That will be just fine with all involved. Vetter says he used to spend three solid weeks spraying at Morton County WMA, and 3-4 days at Fish Creek. While spraying is still necessary in places, biological control is helping the agency treat more acres more effectively, with less time and significantly less money.

"Just the number of dollars we have spent on chemicals…and now, all of a sudden, we don't have to do that," Vetter said. "…It's (biological control) been a great addition."

***CRAIG BIHRLE** is the Game and Fish Department's communications supervisor.*

A pint paper container holds several thousand root-mining flea beetles. In areas where beetles are numerous, it takes only a few net sweeps to fill a cup. On a good day, Game and Fish sweepers can accumlate dozens of bug-filled cups for transplant to new spurge patches.

Joining the Beetle Bandwagon

Adult flea beetles are generally collected in June and early July and distributed to new spurge sites before they lay eggs, so larvae that hatch from those eggs can go to work right away.

While flea beetles were expensive 10 years ago, and they are still offered for sale by some companies, Game and Fish and other state and federal agencies developed their insectories with the intent of providing bugs for free distribution.

County agents have lists of insectories where landowners can go to collect beetles, either on organized sweeps or on their own. Game and Fish wildlife management areas are also generally available for bug collection for personal use. Contact the district managers listed below for information on availability and location.

District I – Brian Prince, Devils Lake; 701-662-3617
District II – Scott Peterson, Lonetree WMA; 701-324-2211
District III – Brian Kietzman, Jamestown; 701-253-6480
District IV – Bruce Renhowe, Bismarck; 701-328-9538
District V – Dan Halstead, Riverdale; 701-654-7475
District VI - Kent Luttschwager, Williston; 701-774-4320

More information on biological control of leafy spurge, or obtaining beetles, is also available from:

Dave Hirsch, USDA-APHIS, 2301 University Dr., Bldg. 23 B, Bismarck, ND, 58504; 701-250-4473; e-mail: david.c.hirsch@usda.gov.

Ken Eraas, ND Dept. of Agriculture. 604 E. Blvd., 6th floor, Bismarck, ND 59505-0020; 701-328-2379; e-mail: keraas@state.nd.us.

Vehicles used to spray spurge can't access sloped areas like this patch in Custer Mine Wildlife Management Area in McLean County. Flea beetles are proving effective for treaty spurge in similar locations.